

## An Evaluation of Native Oyster Restoration in Chesapeake Bay

**Socioeconomic Factors:** What can the restoration efforts and the monitoring efforts tell us about the factors (historical, socioeconomic, conservation goals) that have impelled each effort? Have any of these factors enhanced or inhibited a particular effort?

**Long Term Trends:** Can we learn anything about the length of time required for restoration to be successful in different parts of the Bay? Do sanctuaries work? Under what conditions should sanctuaries be established? What is our definition of the measure of success over different time scales?

**Oyster Disease Links:** Is there evidence of natural disease tolerance evolving in any areas of Chesapeake Bay? How successful have selectively bred, disease tolerant strains been for restoration?

**Economics of Restoration:** How much have these efforts cost, individually or in concert? For those efforts where an economic as opposed to an ecological return was expected (commercial aquaculture or harvest) what has been the economic impact of native oyster restoration programs?

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*The Science Content and Analysis Committee is comprised of active members of the Chesapeake Bay research community with expertise in a wide range of relevant disciplines and direct experience in the native oyster restoration effort. The committee will complete its work by Summer of 2007 and anticipates publication of a final report at that time.*

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*For additional information please contact:*

*Dr. Jonathan G. Kramer, Director  
Maryland Sea Grant College Program  
301-405-7500 or [kramer@mdsg.umd.edu](mailto:kramer@mdsg.umd.edu)*



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# An Evaluation of Native Oyster Restoration in Chesapeake Bay 1990-Present



While oyster restoration has been a priority in the Chesapeake Bay for nearly a century, the past decade and a half has brought a new focus on rebuilding oyster reefs. This effort is driven by a diverse group of stakeholders interested not only in economic benefits but also in the ecological health of the Bay. Restoration has been supported by substantial state and federal appropriations. Recently the Keith Campbell Foundation for the Environment, the NOAA Chesapeake Bay Office (NCBO) and the U.S. Fish and Wildlife Service have initiated a review of past oyster restoration efforts to be held in cooperation with the Chesapeake Bay scientific and management communities. Discussions with stakeholders from Congress, federal and state agencies, non-profit groups, and the leaders of the major research institutions involved in oyster research and management have indicated that such a review is needed and timely. Considering the fiscal investment in oyster restoration, the importance of fully understanding native oyster restoration within the context of the issue of non-native oyster introduction, and the need for increased funding to support restoration at the necessary scales, this evaluation is of vital importance.

This Bay-wide review conducted by a regional group of experts (Science Content and Analysis Committee) will summarize restoration efforts since 1990 and provide a synthesis of the lessons learned with regard to the specific scientific and management goals that have driven the restoration effort and any successes in reaching such goals. The review process involves community-wide input of relevant data and ideas for assessing restoration activities. The analysis and synthesis of this

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information will serve as a critical foundation for formulating more efficient and effective restoration practices for the future. The recommendations resulting from this effort will provide an important complement to the oyster research priorities developed and distributed in reports from the Maryland and Virginia Sea Grant Programs, the National Academy of Science, the U.S. EPA Chesapeake Bay Program Scientific and Technical Advisory Committee, and others. This effort will also dovetail with the Environmental Impact Statement currently under development to evaluate the proposed introduction of *Crassostrea ariakensis* to Chesapeake Bay as well as native oyster alternatives.

### Goal

The goal of the project is for the scientific and management communities to critically evaluate native oyster restoration from 1990 to the present from three perspectives:

- What has been done, in what locations, over what duration, and under what conditions?
- How have efforts addressed the goals set for oyster restoration over this period?
- What lessons can be learned from the results of these efforts?

This evaluation will yield recommendations for the most promising restoration procedures and strategies to be undertaken in the Bay over short (1-2 years) to longer (~10 years) timeframes, recognizing that there will be economic and ecological incentives that will drive the overall efforts.

### Overarching Questions

Oyster beds occur in a mosaic of habitats affected by variables such as salinity, substrate, sedimentation rates, dissolved oxygen, and presence of harmful algal blooms, with some sites being more suitable for spat settlement and others better for fast growth or greater survival. With this in mind, the Science Content and Analysis Committee is addressing the following overarching questions:

1. What is the “guiding image” (relative to location, physical configuration, current and sedimentation patterns in vicinity, biotic make-up of constituents, disease variables) of a healthy oyster bed at a given site? What are the desired restoration goals relative to this image?

2. What might be measured that would indicate progress toward that image (more oysters per unit area; greater diversity and abundances of fish and invertebrates on the bed; clearer water; greater harvest levels)?
3. How do restoration techniques, physical factors and disease interact to affect the success of restoration efforts as measured by survival, recruitment and growth of oysters and the persistence of physical habitat?
4. What ecological conditions are required to allow an oyster bed to be a more resilient, sustainable system, and are such conditions region-specific?

### Specific Questions for Particular Restoration Efforts

**Oyster Restoration Inventory:** What efforts have been made? Where, when, by whom and how (placement of shell, seed, adults; bed configuration, etc.)?

**Rationale for Restoration Efforts:** For what reason were these restoration efforts done (ecological, fishery or both)? What proportion of efforts have focused on shell planting, seed placement, broodstock enhancement, or disease tolerance?

**Monitoring Restoration Efforts:** Which of these efforts incorporated some sort of follow-up study (e.g. monitoring, either cursory or detailed) of the outcome? What information was collected (when, how often, how long, by whom, how and how extensively)?

**Data Availability:** Are these monitoring or ancillary data analyzed or available to be analyzed? If analyzed, what do they tell us about the outcome of the restoration effort (spat set, revived fishery)? If not analyzed but available, what can be learned?

**Ecosystem Factors:** Are ancillary data on water quality, harmful algal blooms, disease, or other relevant variables available for sites on which monitoring was not performed by the restoration effort?

**Restoration Success or Failure I:** Why have some restoration efforts succeeded and some failed? What is the measure of success? What performance measures have been used to evaluate restoration sites? What standards or performance measures are being used in other oyster restoration programs domestically and internationally that could be applied here?

**Restoration Success or Failure II:** To what extent has the scale of restoration been a factor in limiting success? At what scale will restoration make a difference? What production level (spat/year) will be required to implement restoration at such scales?